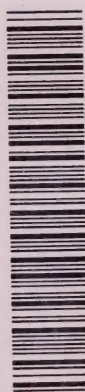


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DEVELOPMENT OF ELECTRIC POWER IN CANADA

Progress Report—1963



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BULLETIN No. 2720—63

JANUARY 1964



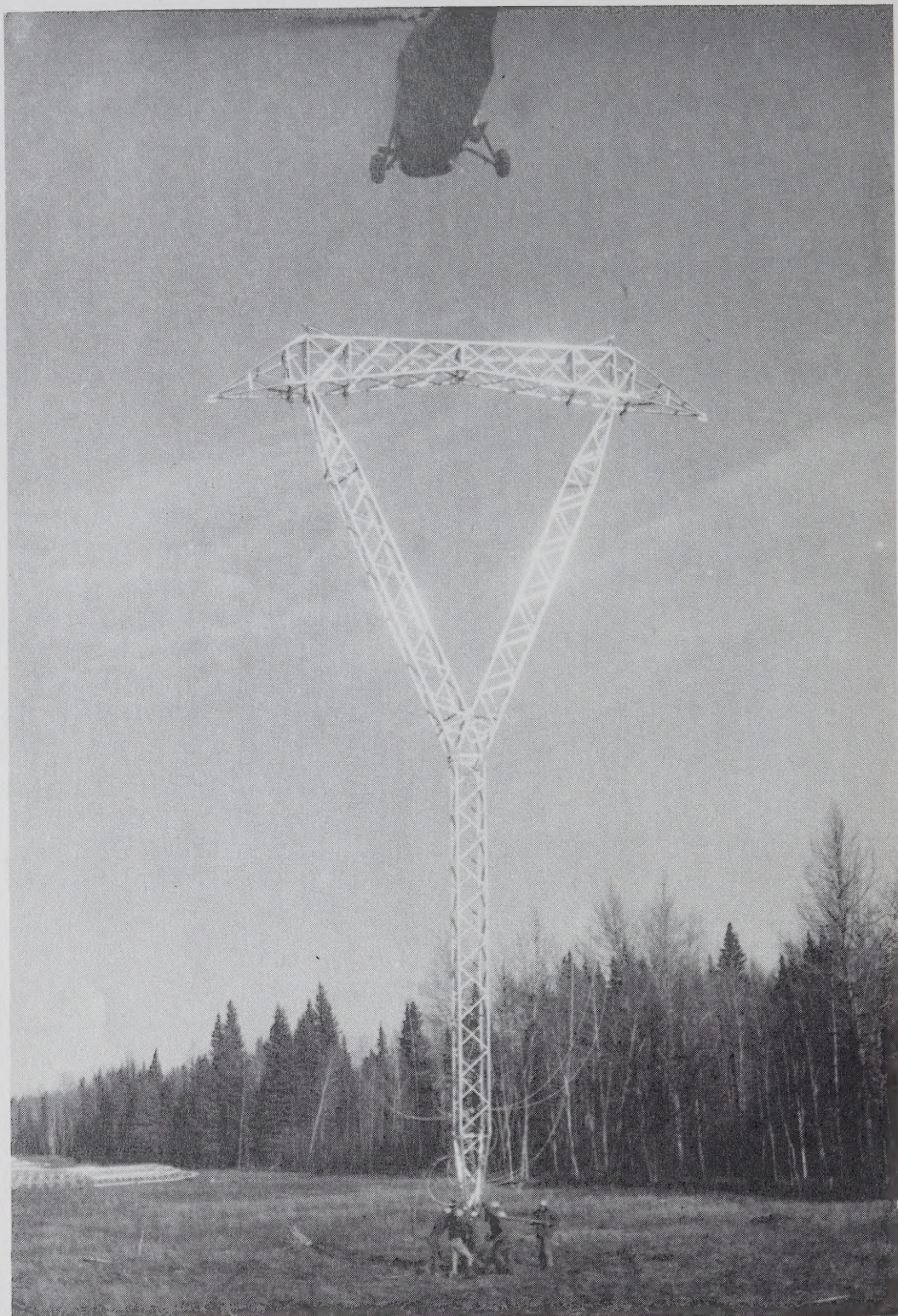
Canada

DEPARTMENT OF NORTHERN AFFAIRS AND NATIONAL RESOURCES
WATER RESOURCES BRANCH



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Aluminum tower for 240-kv. transmission line from Big Bend being erected by helicopter.

DEVELOPMENT OF ELECTRIC POWER I N C A N A D A

A report on progress in the construction of hydro-electric
and thermal-electric power generating facilities during 1963.

BULLETIN No. 2720—63

JANUARY 1964

**DEPARTMENT OF NORTHERN AFFAIRS AND NATIONAL RESOURCES
WATER RESOURCES BRANCH**

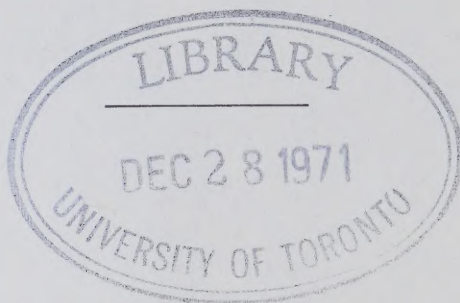
The following bulletins are issued annually by the Water Resources Branch:

"Development of Electric Power in Canada"

"Water Power Resources of Canada"

"Principal Power Developments in Canada"

Copies of these bulletins are available free of charge from the Director, Water Resources Branch, Department of Northern Affairs and National Resources, Ottawa 4, Canada.



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DEVELOPMENT OF ELECTRIC POWER I N C A N A D A

The following review presents for 1963, the results of a regular annual survey carried out by the Water Resources Branch, covering the field of current hydro-electric and thermal-electric power development throughout Canada. The Branch is indebted to provincial authorities and to power producing and distributing agencies for their co-operation in assembling and making available the information from which the review has been compiled.

By the end of 1963, a massive programme of power plant construction in Canada had boosted the nation's total generating capacity by 1,220,000 kilowatts. About 785,000 kw. of this total was hydro, the other 435,000 kw., thermal. No slackening in the pace of development is in sight with 1,349,000 kw. of new capacity scheduled for 1964. Thermal equipment will account for 695,000 kw. of the 1964 total, and hydro for 654,000 kw.

The new capacity added in 1963 brought Canada's total hydro-electric generating capacity to 20.1 million kilowatts. In the same period, the national total for installed thermal generating capacity rose to over 6.2 million kilowatts.

Total capacity of hydro-electric and hydraulic turbines in Canada at the end of 1963 rose to some 28.2 million horsepower. This total includes the capacities of a small number of turbines connected directly to mechanical equipment.

On the basis of the most recent information available, developments at present under construction or in the planning stage are expected to yield almost 9.2 million kilowatts of hydro and 2.8 million kilowatts of thermal capacity after 1964. Almost 5.7 million kilowatts of the projected hydro total will be installed in the generating stations of the giant Manicouagan-Outardes complex now building in Québec Province; another 2.3 million kilowatts of the total will be contributed by the Peace River in British Columbia. Not considered in this total is the Hamilton River which may realize several million kilowatts at two sites.

Despite these impressive capacities, it is expected that the increasing quantities of power available will be readily absorbed by the constantly-growing demands. To be assured of staying abreast of requirements, the plans of Canada's power producers reach a considerable distance into the future. Besides seeking to exploit the conventional means of producing energy, these plans are being formulated to gain the utmost advantage from the most recent techniques in power development and transmission. Rapid advances in extra-high-voltage (EHV) transmission have provided the means of carrying hydro power from relatively remote sites to demand areas at costs competitive with thermal power. As a result, several hydro-electric power sites previously considered outside the economic transmission range are now under construction, while others are under investigation. Recognizing the benefits inherent in the economic transmission of energy over long distances, the Government of Canada is co-operating with provincial authorities in carrying out studies aimed at making more effective use of Canada's water resources and seeking answers to the problems involved in establishing a national power grid.

Canada, recognized as a leader in nuclear research, has recently entered an era which may see growing dependence upon nuclear energy for electric power production. Thermal power from a nuclear reactor first entered a distribution system in Canada in 1962. The source was a 20,000-kw. plant in Ontario. Construction of a major nuclear station, currently in progress, will increase the present modest total by 200,000 kw. in 1965. Plans for even larger plants suggest the probability that nuclear energy will assume more and more of the burden of supplying the nation's power requirements.

Subsequent sections of this review contain details, by province or territory, of progress during 1963 in the construction of new generating capacity, and additional transmission and distribution facilities, with an estimate of further development anticipated for 1963 and the years following. A summary of increases in hydro and thermal capacities in 1963 by province or territory is appended.

Progress in the Provinces and Territories

British Columbia

During 1963, British Columbia's total installed electrical generating capacity was increased by the addition of 72,000 kw. of hydro and 187,680 kw. of thermal capacity.

An expected increase of 150,000 kw. in 1964 will involve thermal equipment only. Construction at present under way will yield over 2.3 million kilowatts of new hydro capacity subsequent to 1964 while expansion of thermal capacity in British Columbia will yield another 450,000 kw.

BRITISH COLUMBIA HYDRO AND POWER AUTHORITY

In 1963, construction crews at the Portage Mountain damsite diverted the Peace River through three 48-foot diameter tunnels, each 2,500 feet long, by-passing a 3,000-foot stretch of the river and making way for the construction of Portage Mountain Dam. The contract for 60 million cubic yards of fill needed for this huge dam was awarded in 1963. By 1968, Portage Mountain Dam, straddling the Peace River Valley for a distance of 1 1/4 miles, will have risen to its full height of 600 feet, forming a 680-square mile lake, the largest in British Columbia. A comparison between the estimated 2.3 million kilowatts at Portage Mountain and the 1.5 million kilowatts installed at Beauharnois in Québec, at present Canada's largest generating plant, gives some idea of the

power available on the Peace River. A second dam and powerhouse twelve miles downstream from Portage Mountain will offer a further 650,000 kilowatts and between this latter site and the British Columbia-Alberta border, the river has an estimated potential of 900,000 kw. First power from Portage Mountain will become available in 1968 and, on the basis of estimates of growth in power demand in British Columbia, all of the power from Portage Mountain will be in use by 1979, and the power from the smaller site by 1982.

Negotiations aimed at clarifying and adjusting arrangements proposed earlier with respect to the Columbia River Treaty were carried on between Canada and the United States during 1963. The Treaty, signed on behalf of the two countries in 1961, provides that Canada would receive one-half of the power benefits accruing in the United States from the regulation of 15.5 million acre-feet of water stored in Canada behind the proposed Duncan Lake, High Arrow and Mica dams on the Columbia



One of three diversion tunnels at the Portage Mountain development on the Peace River.

River. In addition, Canada would receive one-half the value of the estimated flood damage prevented in the United States through operation of the proposed dams for flood control. Canada has not yet ratified the Treaty, but agreement between Canada and British Columbia has been reached with regard to their respective responsibilities under the Treaty.

The second 150,000-kw. unit at the Burrard Thermal-Electric Generating Station was placed in service in January, and a third unit, now being assembled, should be in service in November 1964. The ultimate generating capacity of the Burrard plant will be 900,000 kw. in six units.

Changes in the generating capacities of a number of B. C. Hydro's smaller thermal plants took place during the year. Transfer of a 600-kw. diesel unit from the inactive Fort St. James plant to Hazelton brought the total capacity of the latter to 1,450 kw.; a 250-kw. unit, also from Fort St. James, increased the capacity of the Houston plant to 1,200 kw. The total capacity at Port Hardy was brought to 1,700 kw. with the transfer of a 600-kw. diesel unit from Tofino. A 3,000-kw. gas diesel unit is being moved from Quesnel to Dawson Creek to boost power facilities serving Dawson Creek and Fort St. John to 20,000 kw. Twin 3,000-kw. units from Quesnel will be moved to Chetwynd to help supply the power needed for construction of Portage Mountain Dam. A new 6,000-kw. gas turbine peaking unit was scheduled for installation at Prince George before the end of 1963. The addition of this unit will bring to a total of 29,000 kw. the power available to serve the increasing needs of Prince George, Vanderhoof and Fort St. James.

B. C. Hydro's generating and distributing facilities do not yet form a single integrated system, although complete integration is the ultimate objective. The portion of the system at present integrated was extended in 1963 by construction of 140 miles of 230-kv. line from Bridge River to Soda Creek. In the area south of Kamloops, a 31-mile, 60-kv. line (to 138-kv. standard) now connects Bethlehem Copper and Craigmont Mines. With construction of this line, the Southern Interior and Lower Mainland generation and transmission systems are connected for the first time. In Duncan power district, work on a 10-mile, three phase, 25-kv. extension, to serve customers at British Columbia Forest Products Caycuse Camp was completed in the spring. At the northern end of Vancouver Island, a 25-kv. line was constructed from Port Hardy Generating Station to Port McNeill, a distance of 18 miles, and a new 51-mile, 66-kv. line from Great Central Lake now serves the Ucluelet-Tofino district on the west side of Vancouver Island.

A 230-kv. line, expected to be in service from Soda Creek to Prince George by late 1964, will extend the integrated system still further. Construction of 60 miles of 138-kv. line from Dawson Creek to Chetwynd is also scheduled for completion in 1964. At the present time, a second transmission tie line to the Bonneville Power Administration for eventual operation at 500 kv. is under application to the National Energy Board.

B. C. Hydro's rural electrification operations were extended with construction of distribution lines to serve many small areas of the province. At the end of the year, the estimated total number of rural customers served by B. C. Hydro was 100,000.

CONSOLIDATED MINING AND SMELTING COMPANY OF CANADA LIMITED

Installation of the third generating unit at the Waneta plant on the Pend d'Oreille River was completed in May, bringing the total generating capacity of the station to 216,000 kw. in three similar units. The first two turbines were each rated at 120,000 hp. under a 210-foot head, but because of design improvements, the third turbine, in a setting similar to that of the first two, is rated at 130,000 hp. under the same head.

In January, the National Energy Board approved the Company's application for the construction and operation of a 230-kv. tie line to provide an energy interchange with Bonneville Power Administration. This line, with step-down and control facilities, is expected to link Trail, British Columbia with Spokane, Washington, in the autumn of 1964.

An increase of 60 mva. of step-down transformer capacity at Kimberley, was expected to be on the line in October 1963.

WEST KOOTENAY POWER AND LIGHT COMPANY LIMITED

The Company is replacing the wood crib dam at Lower Bonnington on the Kootenay River with a concrete structure, making provision at the same time for future installation of a 19,000-kw. generator driven by a 25,000-hp. turbine at the existing hydro plant. Work on the new dam will be completed by April 1964.

Westward extension of the 138-kv. transmission line from Rossland to Oliver is proceeding on schedule. The line was completed between Rossland and Grand Forks in 1962 and extended as far as Rock Creek in 1963. The last section between Rock Creek and Oliver will be in operation by the autumn of 1964.

In September 1963, the Company commenced electrical service to the village of Kaslo and the municipal hydro and diesel plants were removed from service. Rural extensions during the year brought service to several communities in the area of the North Fork of the Kettle River.

The total number of rural customers served in 1963 was expected to reach 14,500.

MACMILLAN, BLOEDEL AND POWELL RIVER LIMITED

In October 1963, installation of a 31,680-kw. generator at the Harmac plant near Nanaimo was completed. Total generating capacity at Harmac is now 36,930 kw.

CITY OF REVELSTOKE

Construction has started on a storage dam on the headwaters of Cranberry Creek, designed to impound an estimated 11,000 acre-feet of water. The dam is expected to be completed in mid-1964.

The availability of adequate storage would be particularly significant should the City of Revelstoke decide to increase the capacity of its Cranberry Creek plant. The present capacity of the plant is 5,800 hp. in one unit. However, there is provision in the powerhouse for a second unit.

Alberta

The increase in the Province's total generating facilities in 1963 amounted to 75,000 kw. of thermal capacity. Removal of a small thermal plant reduced this total to a net total of 73,750 kw. There were no hydro additions during 1963, but current construction should yield 159,720 kw. of new hydro capacity in 1964. The forecast for thermal installations for 1964 indicates 32,000 kw. of new capacity. Several other schemes of development, now in the planning stage, will bring additional thermal capacity on line within the next few years, but firm figures and schedules for these schemes are not yet available.

CALGARY POWER LTD.

By the fall of 1964, the first generating unit at Big Bend on the Brazeau River will be ready for operation. This unit will consist of a 150,000-kw. generator driven by a 210,000 hp. turbine operating under a head of 387 feet. The powerhouse at Big Bend is located about twelve miles downstream from the main Big Bend dam, and water from the reservoir is carried to the plant by way of a canal. Dyking for this canal involved the placement of some 2,750,000 cubic yards of material. Incorporated in the reservoir outlet works will be two pump-generator units, each rated at 9,720 kw. at 0.90 power factor. One of these units is now being installed for use in conjunction with the first generating unit



Penstock erection at Big Bend power site on the BrazEAU River.

in the powerhouse. Under operating conditions, when the reservoir storage level is higher than the canal elevation, the pump-generator unit functions as a generator to provide additional power; when the reservoir is lower than the canal level, the unit is used as a pump to raise water to the canal and thence to the power plant. Pumping capacity of the unit will be 3,100 cubic feet per second under a head of 25 feet. Output from the Big Bend station will augment the system peaking capacity at present being supplied by the Company's plants on the Bow River.

The present 282,000-kw. capacity of the Company's Wabamun thermal plant is expected to be increased with addition of a 225,000-kw. turbo generator in 1967.

In the power transmission field, Calgary Power Ltd. is building a 240-kv. line to carry power from Big Bend to the sub-station at Benalto, a distance of 70 miles. This line will be the first of its type to be built west of Ontario. Approximately half the line mileage will be carried on guyed, aluminum alloy, Y-shaped towers, 131 in all, weighing between 1,800 and 1,900 pounds each. Installation of the towers, to be carried out by helicopter, was scheduled for November and the work of setting all of the towers into position was expected to take about one week.

During 1963, the Company also completed installation of 203.3 circuit miles of 132-kv. line, 20.4 miles of 66-kv. line, 33.5 miles of 33-kv. line and 10.3 miles of 23-kv. line for a total of 267.5 circuit miles.

Seven new transformer sub-stations with a combined total capacity of 53,500 kva. went into service at Burdett, Stavely, Empress, North Lethbridge, Rimbey, Shepard and Warner, and extensions to existing sub-stations at Ghost, Glenwood and Edmonton accounted for a further 17,500 kva. of new capacity. At Medicine Hat, the capacity of the sub-station owned jointly by the City of Medicine Hat and Calgary Power Ltd. was increased by the addition of new equipment rated at 30/40 mva.

CITY OF EDMONTON

The City of Edmonton reports the commissioning of a 75,000-kw. thermal unit in August 1963. Because of increasing demand on its system, the City also approved installation of a tenth and final unit at the Edmonton plant.

The City increased the capacity of one of its bulk stations from 30/40 mva. to 60/80 mva., and put a new 10,000-kva. distribution station into service.

CANADIAN UTILITIES LIMITED

The Canadian Utilities Limited thermal plant at Battle River is well on the way to doubling its present 32,000-kw. capacity. The addition

of the second 32,000-kw. generating unit is proceeding on schedule, with in-service date expected in 1964.

NORTHLAND UTILITIES LIMITED

With the Lac La Biche area now connected to the Company's transmission system, the 1,250-kw. Lac La Biche thermal plant which previously served the area was taken out of operation.

Transmission line mileage was increased during the year by a total of 43 miles of line with voltages varying between 7.2 and 25 kv. Total transformer sub-station capacity in the Company's system reached 30,500 kva., an increase of 6,000 kva. over last year's total.

At the end of 1963, 3,461 rural customers were being supplied with power by Northland Utilities Limited.

ALBERTA POWER COMMISSION

The Alberta Power Commission reports that, by the end of 1963, the total number of rural customers being served in the Province will have increased to 69,172. This is an increase of 1,581 over the corresponding figure for 1962. The increase includes statistics on all the power producing companies and agencies in the Province.

Saskatchewan

Prior to 1963, Saskatchewan's total hydro-electric generating capacity of approximately 119,000 kw. was used solely to service mining operations in the northern part of the Province. Power to satisfy most industrial and domestic demands in the southern part of the Province was previously supplied by thermal plants operated by the provincially-owned Saskatchewan Power Corporation. The year 1963 marks the first time that hydro-electric power generated in the Province has been fed into the Saskatchewan Power Corporation system. The installation of 134,000 kw. of hydro capacity is the first step in a long-range programme to develop the water power resources of the Saskatchewan River basin. Another 67,000 kw. is scheduled for 1964, and 186,600 kw. in the years subsequent to 1964.

In the thermal field, the Province's total installed capacity decreased by 59,700 kw. with the closing down of two thermal stations.

There are no firm reports of thermal additions for 1964 or the years immediately following.

SASKATCHEWAN POWER CORPORATION

First power from Squaw Rapids on the Saskatchewan River became available in the spring of 1963. The present installation consists of four 46,000-hp. turbines, each connected to a 33,500-kw. generator. By the summer of 1964, the Corporation's first hydro station will house two more units, giving the plant a total turbine capacity of 276,000 hp., driving generators with a total capacity of 201,000 kw. There is provision in the powerhouse for another two units.

At the South Saskatchewan River project near Outlook, closure of the dam is scheduled for February 1964 if the flow in the river drops below 3,000 cubic feet per second. All of the river flow will then be passed through diversion tunnels and work will begin on construction of a 70-foot high cofferdam immediately upstream from the main dam. The cofferdam will allow work on the main dam to be carried on without concern for high summer flows in 1964. The dam and reservoir are being built by the Prairie Farm Rehabilitation Administration for irrigation purposes, but hydro-electric generation facilities will be included. Saskatchewan Power Corporation will install these facilities, with first power expected in 1967 when two 62,200-kw. generators go on the line. Plans call for the addition of a third unit of the same size early in 1969. Three of the five diversion tunnels, originally used for dewatering purposes at the dam, have been lined with steel and will serve as penstocks to carry water from the reservoir to the power plant.

The Corporation has investigated the feasibility of building a pumped storage project on the Anerley Lakes chain near the South Saskatchewan River Dam. The project, if built, would create a storage reservoir on the Anerley Lakes with a level about 100 feet above the level of the South Saskatchewan River Dam reservoir. Surplus hydro and thermal energy could be used during off-peak periods to pump water from the lower reservoir into the Anerley reservoir. The stored water would be released to generate power during peak load periods. A final decision on the project has not yet been reached.

The cities of Moose Jaw and Prince Albert were connected to the provincial grid system in 1963 and the thermal plants rated at 37,500 kw. and 22,200 kw. respectively, which supplied these two centres, were closed down.

The Corporation reports construction of a total of 55 miles of 72-kv. transmission line during the year. New transformer sub-stations with capacities of 3,000 kva. and 5,000 kva. respectively were built at Elrose and Moose Jaw. The sub-stations at Nipawin and Hatfield were each increased by capacities of 3,000 kva. and the capacity of the sub-station at Red Jacket was raised from 3,000 kva. to 5,000 kva.

A complete 230-kv. switching station was built at Beatty and a 230/138-kv. transformer installed in the Queen Elizabeth switching station at Saskatoon.

By the end of 1963, the Corporation was providing electrical service to 61,224 farms.

Manitoba

The development of Manitoba's water power potential moved ahead steadily in 1963. Although there were no new hydro units commissioned during the year, current construction will bring 220,000 kw. into operation in 1964 and another 110,000 kw. later.

During 1963, the increase in thermal capacity was limited to the small amount of 150 kw.

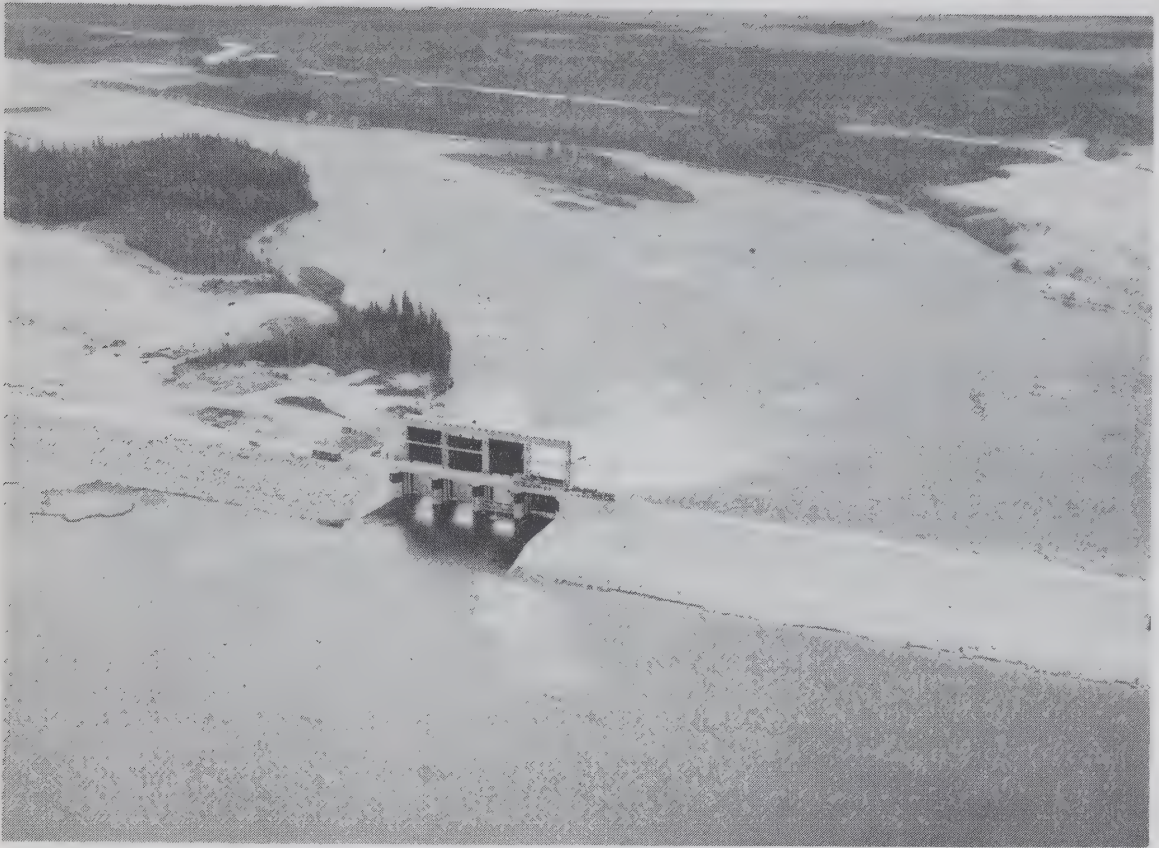
MANITOBA HYDRO

Fine weather helped maintain the construction schedule at Grand Rapids on the Saskatchewan River. The first unit should go on the line in September 1964, the second in November 1964 and the third in May 1965. The units consist of 110,000-kw. generators driven by 150,000-hp. turbines operating under a head of 120 feet. There is provision in the powerhouse for eventual addition of a fourth unit. Concrete work for the spillway intake structure, penstock encasement and powerhouse sub-structure is virtually complete. The flow of the Saskatchewan River is being diverted through the spillway. Curtain grouting of the limestone bedrock along the 18 miles of dyke is practically complete and construction of the dyke itself is on schedule.

Power for construction work at Grand Rapids is obtained from two mobile diesel units, one rated at 1,000 kw. and the other at 350 kw.

The large Rosser Terminal Station, near Winnipeg, is at present under construction. In 1963, this station commenced service as the eastern terminus for the 230-kv. link between Brandon and Winnipeg; however, its use as the southern terminal point for 230-kv. lines from the Grand Rapids Hydro-Electric Development on the Saskatchewan River will not be realized until 1964.

A switching station which will permit the bussing of the two 230-kv. lines carrying Saskatchewan River power will be constructed at



Spillway gates at Grand Rapids power site on the Saskatchewan River.

Ashern, midway between the Grand Rapids Development and the Rosser Station. It will also fill the role of a terminal point for serving the new Vermilion Terminal Station being constructed near Dauphin.

The 145.7-mile section of the 230-kv. line between Grand Rapids and the Ashern Switching Station is under construction and should be completed in the summer of 1964. The 113-mile section between Ashern and the Rosser Station is also scheduled for completion in 1964. Field surveys have been carried out along the route of the Ashern-Vermilion, 230-kv. line, due to go into service in October 1965. The 230-kv. line between Brandon Generating Station and Rosser Terminal Station was completed in 1963.

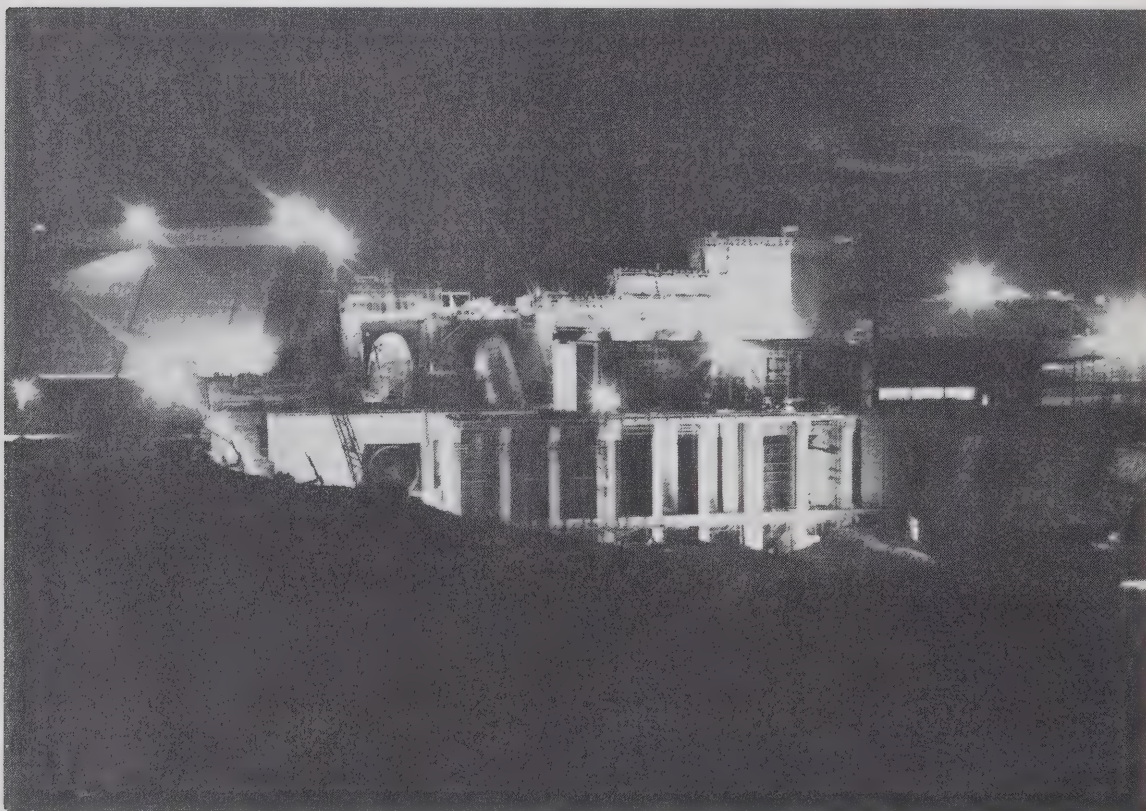
Substantial progress has been made on investigation of the water power potential of the Nelson River, under the direction of a federal-provincial board. Early in 1963, an extensive programme of aerial photography and topographical mapping of the lower Nelson River was completed and since then, surveys and subsurface investigations have been under way on the reach of the river between Kelsey Generating Station and Hudson Bay, chiefly at Kettle Rapids, Long Spruce Rapids and Limestone Rapids. Particular attention is being paid to the geology, overburden, permafrost and granular material deposits in these areas. Diamond drilling through overburden into bedrock has been carried out

at the three sites mentioned above. Information obtained through these investigations is being used to compute detailed cost estimates for alternative developments at the three sites and to assist in appraising the power development possibilities of this reach of the river.

A new diesel unit rated at 150 kw. was installed at the thermal plant at Bakers Narrows, bringing the plant total capacity to 230 kw. Power from the Bakers Narrows plant is used to serve summer cottages in the area.

Arrangements have been completed with the Department of National Health and Welfare of Canada for Manitoba Hydro to assume responsibility for generation and distribution of electric power at Norway House. Construction of a new power station to provide this service commenced in 1963. The station will house two 350-kw. diesel units transferred from the Grand Rapids site and three 60-kw. diesel units previously used to supply the local Indian Hospital and associated residences. Total capacity of the station will be 880 kw.

Manitoba Hydro's current programme of expansion of power transmission and distribution facilities is a major one. Some activities have already been referred to. In other activities, terminal stations at Brandon, Virden, Treherne, Portage la Prairie and Whiteshell were being



Work progressing under floodlights at Grand Rapids powerhouse on the Saskatchewan River.

extended in 1963 while new stations were under construction at Selkirk, Winnipeg and Minnedosa.

The total net increase in the capacity of transformer sub-stations built or extended during 1963 was 74,250 kva.

In addition to the transmission lines already mentioned in connection with power distribution from the Grand Rapids site, Manitoba Hydro constructed a 115-kv., 101-mile line between Dauphin and Minitonas, operating temporarily at 66 kv., and a 115-kv. line, 85 miles long, from Neepawa to Birtle. The 20-mile Neepawa-Minnedosa section of the Neepawa-Birtle line was completed in 1963, and the 65-mile section joining Minnedosa and Birtle should be completed in the autumn of 1964.

Distribution lines to a total of 217 miles went into service or were under construction during the year. Of this total, 85 miles will operate at 115 kv., 83 at 66 kv., and 49 at 33 kv.

The total number of farms served by Manitoba Hydro at the end of 1963 approximated 39,000.

Ontario

The total of 412,800 kw. of electric power generating capacity installed in Ontario in 1963 was the largest amount installed in one province in Canada during this period. The total installation included hydro and thermal capacity in approximately equal amounts. The forecast for 1964 indicates an increase of 315,000 kw., most of which will be thermal. Based upon current construction and upon the extent of provision in existing plants for the addition of new units, Ontario's hydro capacity after 1964 should see an increase of 813,200 kw. The corresponding figure for thermal capacity is 1,700,000 kw.

For many years, electric energy generated in hydro-electric plants satisfied almost all of the demand for power in the Province. More recently, the emphasis moved to thermal development, largely because most of the hydro sites within economic distance of demand centres in Southern Ontario had already been developed. Recent developments in extra-high-voltage transmission techniques, however, have increased significantly the distance over which electric power may be carried economically. This has led to the investigation of a number of hydro-electric power sites whose development was previously considered uneconomic because of their remote locations. Several of these sites are now under development.

THE HYDRO-ELECTRIC POWER COMMISSION OF ONTARIO

The most recent forecast of loads to be met by the Commission's system indicates that approximately 2,275,000 kw. of new generating capacity will be required over the next five years. To provide this additional capacity, Ontario Hydro was engaged during 1963 in the planning or construction of seven generating stations, of which four are hydro-electric, two conventional thermal-electric and one nuclear thermal-electric. The ultimate generating capacity of the seven stations is expected to add some 2.8 million kilowatts to the Commission's system; however, not all of this new capacity has been scheduled.

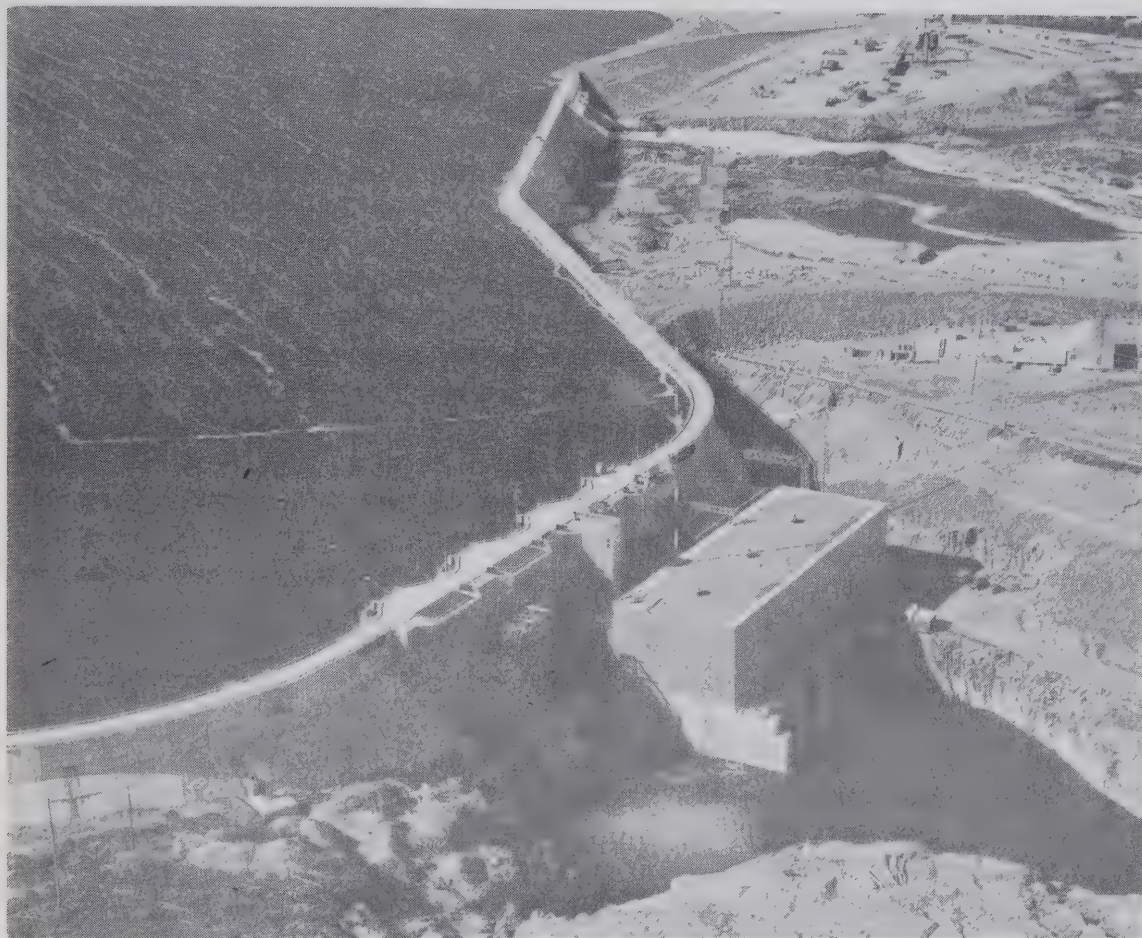
Other major projects which form part of the current scheme of development were under way during the year. These include an extension to the control dam and excavation of the riverbed in the Niagara River above Niagara Falls, an extra-high-voltage transmission line leading from the new generating complex in the James Bay watershed to load centres in southern Ontario, and two river diversions.

The hydro-electric stations under construction during the year were the Otter Rapids Generating Station on the Abitibi River and the Little Long, Harmon and Kipling Stations on the Mattagami River.

The Otter Rapids Station, with two units already in operation, was extended in 1963 by the addition of two more units. Each of the four units consists of a 60,000-hp. turbine driving a 43,700-kw. generator. Headworks have been completed for a total of eight units; however, the dates of installation of the remaining four units are as yet unscheduled.

Diversion of the flow of Little Abitibi River through Newpost Creek into the Abitibi River was completed in 1963. The diverted waters now enter the Abitibi River at a point about eight miles upstream from Otter Rapids, thereby adding some 2,000 square miles to the drainage area above the new plant and to other sites which are as yet undeveloped downstream.

At Little Long Generating Station, construction has brought about the installation of two units consisting of two 84,000-hp. turbines connected to 60,800-kw. generators. There is provision in the headworks for two other units which remain to be scheduled. In addition to the headworks and powerhouse, the project includes the construction of two spillway sluices, a concrete gravity dam approximately 2,200 feet long, an eight-gate flood control structure, approximately 5 miles of earth dike with a maximum height of 60 feet, and the excavation of approximately 1,800,000 cubic yards of earth and rock for the tailrace cut. A flood control structure is incorporated in the earth dike on the east bank of the river at a point about two miles from the headworks and powerhouse. Excess river flows will be diverted through this structure and down the course of Adam Creek which flows into the Mattagami at a point below both Harmon and Kipling Generating Stations, now under construction downstream from Little Long Generating Station. The diversion of flood flows in this way has made it unnecessary to include more than two spillway sluices at each of the two downstream stations.

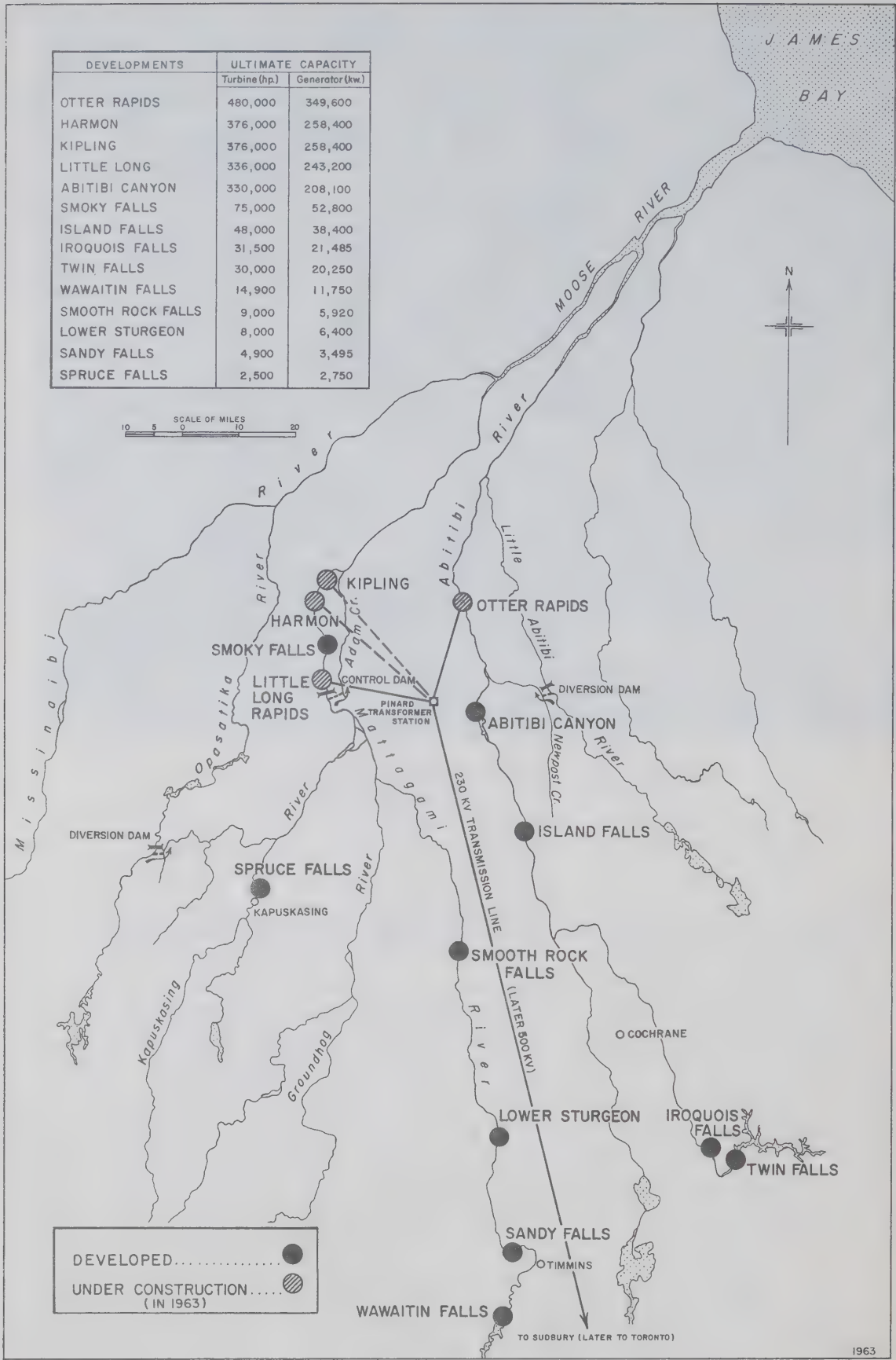


Little Long Generating Station on the Mattagami River.

At the Harmon site on the Mattagami River, the placing of concrete for the lower half of the gravity section of the dam has been completed. The remainder of the work on the project will be carried out while the river flow passes through two diversion ports in this part of the structure. When complete to the stage now planned, the station will comprise a four-unit headworks and two-unit powerhouse on the west bank, two spillway sluices on the east bank, and a connecting gravity section in the river channel. Short earth dikes at each end of the concrete section will complete the dam. Contracts have been awarded for the supply of headgates for units 1 to 4, and for the turbines and generators for units 1 and 2. Each turbine is rated at 94,000 hp., and each generator at 64,600 kw. Units 3 and 4 are not yet scheduled.

The Commission plans an installation of 186,000 hp. in two units in the initial stage of development at Kipling on the Mattagami River. The generators which will form part of these units are rated at 64,600 kw. each. During 1963, a 3.5-mile service road joining the Harmon and Kipling sites was built and a programme of foundation investigation at the Kipling site was completed. Clearing of the site and construction of coffer dams are now in progress. Tenders for the hydraulic turbines and governors have been received and are being evaluated.

DEVELOPMENTS	ULTIMATE CAPACITY	
	Turbine (hp.)	Generator (kw.)
OTTER RAPIDS	480,000	349,600
HARMON	376,000	258,400
KIPLING	376,000	258,400
LITTLE LONG	336,000	243,200
ABITIBI CANYON	330,000	208,100
SMOKY FALLS	75,000	52,800
ISLAND FALLS	48,000	38,400
IROQUOIS FALLS	31,500	21,485
TWIN FALLS	30,000	20,250
WAWAITIN FALLS	14,900	11,750
SMOOTH ROCK FALLS	9,000	5,920
LOWER STURGEON	8,000	6,400
SANDY FALLS	4,900	3,495
SPRUCE FALLS	2,500	2,750



Hydro-electric generating stations in the James Bay watershed.

Flows at all three of the developments outlined above will be increased by a diversion into the Mattagami River of water from the Opasatika River, expected to be in operation by the Spring of 1965. The diverted water, controlled by a timber-crib dam on the Opasatika River, will flow through an excavated channel about 6,200 feet long and then through a series of tributaries which flow into the Mattagami River at a point upstream from Little Long Generating Station.

A 5-gate extension to the 13-gate control structure in the Niagara River above the falls was completed and placed in service in September 1963. In addition, an extensive programme of dredging and excavation of the riverbed was completed. This involved the removal of more than 200,000 cubic yards of rock in the vicinity of Tower Island near the end of the control structure. These works were necessary to improve the control of flows over the falls and to facilitate the passage of ice down the river.

At Thunder Bay Generating Station in Fort William, tests and modifications of the boiler and turbine were completed, and the 100,000-kw. unit was commissioned in July 1963.

At Lakeview Generating Station near Toronto, work is progressing on the installation of the third and fourth 300,000-kw. units. These units are expected to be commissioned in the Spring of 1964 and early in 1965, respectively. It was decided recently to install a total of eight units at the station with the last of these tentatively scheduled for commissioning in the autumn of 1968. The eight units will have a total rated capacity of 2,400,000 kilowatts.

Douglas Point Nuclear Power Station now under construction on the shore of Lake Huron between Kincardine and Port Elgin, is a joint undertaking of the Commission and Atomic Energy of Canada Limited. At the site, the erection of buildings is virtually complete and work is under way on the installation of major items of equipment. The 200,000-kw. unit is scheduled for commissioning in 1965. Plans are being considered for the installation of larger units either at Douglas Point or at some other site.

Since October 1963, power generated at Otter Rapids and the newly-completed Little Long Generating Station has been transmitted at 230 kw. over two new transmission lines to Pinard Transformer Station, near Abitibi Canyon Generating Station. Pinard Transformer Station, also newly placed in service, will eventually serve as a gathering station for power generated at all four new stations now in service or under construction in the James Bay watershed. From Pinard Transformer Station, power is being transmitted southward over a new 227-mile, single-circuit, EHV line to Hanmer Transformer Station near Sudbury. The line is being operated at 230 kv. at present, but as southward extensions are completed, it will be converted in sections to operation at 500 kv. By the summer of 1966, extensions will have been completed to Kleinburg Transformer Station near Toronto and the whole line,

totalling 435 miles in length, will then be operated at 500 kv.

Among the other new transmission lines completed during 1963 were two 230-kv. circuits, one between the Lakeview Generating Station and the A.W. Manby Transformer Station in western Metropolitan Toronto, and the other, a 31-mile, double-circuit, 230-kv. line between Douglas Point Nuclear Power Station and Hanover Transformer Station. The latter line is at present supplying power for an electric heating load at the nuclear power station, but eventually it will transmit power from the nuclear station to the Commission's East System.

With completion of the lines referred to above and a number of shorter, lower-voltage lines, the Commission's transmission network was expanded during 1963 by the estimated net addition of 375 circuit miles to a total of 18,495 circuit miles. The rural distribution system was extended by the estimated net addition of approximately 440 miles of line. At the end of the year, more than 49,000 miles of rural distribution line was in service to supply approximately 514,000 rural customers.



Douglas Point Power Station, Canada's first full-scale nuclear-electric generating plant.

To meet the possibility that the actual demand for power will exceed forecast estimates, the Commission is actively considering the development of a number of hydro-electric sites, including Mountain Chute on the Madawaska River, Maynard Falls on the English River, Chigaminwingum Falls on the White River, Long Sault Rapids on the Abitibi River, and a site at the confluence of the Montreal and Matabitchuan Rivers. The Commission is also considering plans for the installation of two 500,000-kw. thermal-electric units at a new generating station in southwestern Ontario. The development of these plants has not yet been firmly scheduled, but work will probably begin on most of them during the next ten years.

GREAT LAKES POWER CORPORATION LIMITED

The Corporation reports that construction of the new Hogg Generating Station on the Montreal River is in progress. The station will house a 15,000-kw. generator driven by a 21,750-hp. turbine and is expected to be in service in December 1964.

INTERNATIONAL NICKEL COMPANY OF CANADA LIMITED

Two turbo-generator units, each rated at 8,900 kw., were installed at the Company's iron ore recovery plant in Copper Cliff. These units are being used to produce power from waste steam.

DOW CHEMICAL OF CANADA, LIMITED

The Company installed two turbo-generators at its plant in Sarnia. The units, each rated at 30,500 kw. were scheduled to go into operation in November 1963.

ALGOMA STEEL CORPORATION LIMITED

Algoma Steel's generating station at Sault Ste. Marie has been extended to house two new turbo-generators. Addition of these units, each rated at 12,500 kw., boosts the capacity of the station to 29,500 kw.

Québec

Although the development of Québec's water power resources over the past decade has been spectacular, the rapid pace of development in 1963 and in the next few years promises to overshadow past accomplishments.

Completions in 1963 brought 270,000 kw. of new hydro-electric generating capacity on line. The anticipated addition of 192,000 kw. in 1964 is but a small part of the current hydro-electric programme involving capacity totalling almost 5.9 million kilowatts. Of this total, some 2.7 million kilowatts is under construction while the remainder is planned for installation in the years ahead.

Although there was no increase in thermal-generating capacity in 1963, construction of 150,000 kw. of new capacity is scheduled for completion in 1964, while another 160,000 kw. is slated for service after 1964.

During 1963, the Government of Québec, through the Québec Hydro-Electric Commission, nationalized the assets of the major private power producing companies in Québec. Although ownership is now vested in the Province of Québec, the general administrative framework of each of these companies has been retained, at least for the present. The companies include Shawinigan Water and Power Company, Gatineau Power Company, Southern Canada Power Company, Québec Power Company, Lower St. Lawrence Power Company, Northern Québec Power Company and Saguenay Electric Company.

QUÉBEC HYDRO-ELECTRIC COMMISSION

Construction of the Carillon development on the Ottawa River brought about the installation in 1963 of 6 more units, each consisting of a generator of 45,000 kw. driven by a 60,000-hp. turbine. This addition of 270,000 kw. at Carillon represents the total of new hydro-electric capacity added in 1963 in the Province. The remaining four units scheduled for service at Carillon will make up the major portion of new hydro-electric installation for 1964. On completion, the Carillon development will consist of 14 units with a total turbine capacity of 840,000 hp. and a total generating capacity of 630,000 kw. In 1963, construction of a double circuit, 120-kv. line from Carillon to Montreal was completed.

The only other new hydro-electric capacity scheduled for service in 1964 is located at the Commission's Rapid II plant, also on the Ottawa River. By July 1964, the fourth and final unit consisting of a 16,000-hp. turbine and a 12,000-kw. generator will be in operation, raising the plant's generating capacity to 48,000 kw.

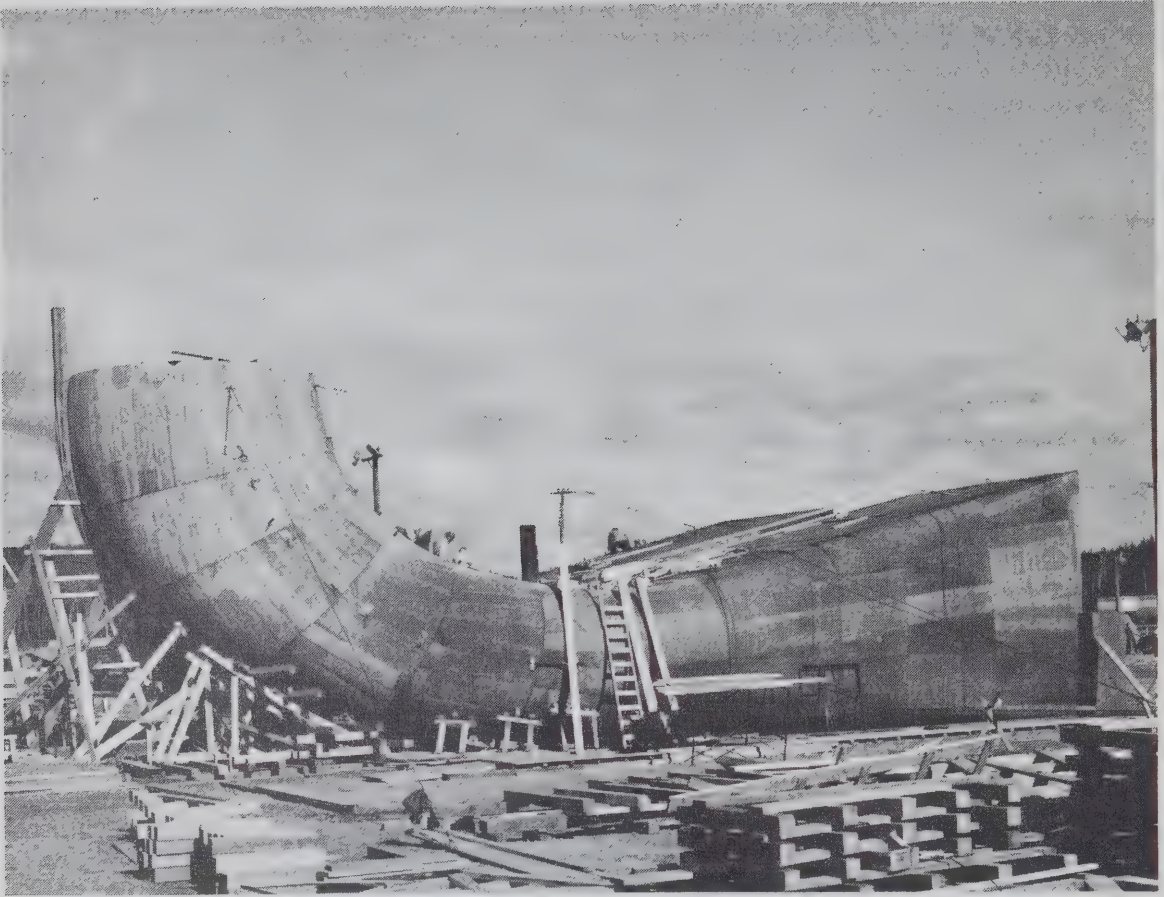
Although their contribution to meeting Quebec's power load up to the present has been a modest one, the Manicouagan and Outardes Rivers appear destined to meet most of the Province's electric power needs for many years to come. As proposed, the two rivers would be harnessed as an integrated system with some 5,688,000 kw. of new capacity to be installed in 8 plants, including two existing plants which would be extended. Construction of two plants, "Manic 2" and "Manic 5", has begun. On completion of total river development, the entire head available on the

Manicouagan River will have been utilized, with the tailrace elevation of one plant being the forebay elevation of the next plant downstream.

To augment the flows available for the Manicouagan-Outardes complex, a study is under way to determine the possibility of diverting runoff from 1,000 square miles of the Kaniapiskau River Basin into the upper part of the watershed of the Manicouagan River. At the Manic 5 site, about 26 per cent of the concrete work has been completed on what will be one of the highest and most massive dams of its kind in the world. The dam, a buttressed multi-arch structure, will be over 4,000 feet long and some 703 feet high at the highest point above bedrock. Two 47-foot tunnels, 2,000 feet long, carry the river flow around the construction site. In the spring of 1964, the tunnels are scheduled to be plugged and the reservoir will begin to fill. Concreting of the dam is not expected to be completed before the end of 1966, well before the final date in 1971 when the reservoir is scheduled to be filled. The start on filling the reservoir will signal start of power plant construction of Manic 5. By 1968, the powerhouse and substation will be completed and the first unit will go on line. The entire plant is scheduled for completion by 1971, when 8 units with total turbine capacity of 1,800,000 hp. and total generating capacity of 1,344,000 kw. will be in operation.



Scale model of Manic 5 dam now under construction on the Manicouagan River.



Fabrication of molded formwork for Manic 2 powerhouse on the Manicouagan River.

Manic 2, located only 11 miles from the mouth of the river, will be the first of the new plants to supply power. The gravity dam, construction of which is well under way, will be the largest "hollow joint" dam in the world - in its design, hollow cells reduce concrete requirements by 15 per cent without affecting the strength or the stability of the dam. In July 1965, the first of eight 170,000-hp. turbines driving 140,000-kw. generators will be in operation. The entire plant with total generating capacity of 1,120,000 kw. is expected to be in service by 1967. In 1965, filling of the reservoir above Manic 5 will have to be reconciled with the need to allow sufficient releases to operate the new Manic 2 plant.

A third site scheduled for development on the Manicouagan River is Manic 3, located at a series of falls about 50 miles from the river's mouth. Seven units consisting of 210,000-hp. turbines driving 160,000-kw. generators are proposed for the site. The dam at the site will be a rock-fill structure.

An existing development, McCormick Dam near Baie Comeau, has a generating capacity of 191,250 kw. in 5 units. The owner, Manicouagan Power Company, has been commissioned by Québec Hydro to complete the plant with the addition of two more units totalling 104,000 kw. Another plant, utilizing the same headpond as the McCormick Station has been

proposed for development by Québec Hydro. Preliminary surveys for the new plant, Manic 1, have begun and tentative plans call for 4 turbines totalling 300,000 hp. driving generators totalling 208,000 kw. It is likely, however, that the size of units will be increased.

On the Outardes River, preliminary studies are nearing completion at Outardes 58 and similar studies are well under way on the Outardes 45 site. The installed capacities will be 600,000 kw. at Outardes 58 and 880,000 kw. at Outardes 45. The existing 70,600-hp. Outardes Falls development of Québec North Shore Paper Company will stand to gain from upstream regulation, and three units of 135,000 hp. each driving 104,000 kw. generators, are proposed for installation at that site.

Power from the plants composing the Manicouagan-Outardes complex will be transmitted via 300-kv. circuits to two major collector stations where voltages will be stepped up to 735 kv. for transmission to Québec City and Montréal. This latter voltage is the highest presently planned for long distance transmission in Canada, and is amongst the highest in the world.

In the field of electric power transmission, the Commission completed 132 miles of 120-kv. line to provide power to the mining centre at Mattagami and completed a 161-kv. line to supply power for a new paper mill at Chandler.

Although the Commission is maintaining its rapid pace of development in the Manicouagan and Ottawa River basins, it has nevertheless undertaken studies for the possible development of rivers draining to the James Bay - Hudson Bay area.

THE SHAWINIGAN WATER AND POWER COMPANY

Construction of the 300,000-kw. thermal-electric plant at Tracy near Sorel on the south shore of the St. Lawrence River is going ahead on schedule and the first of two 150,000-kw. steam turbines is expected to be in operation in July 1964. The second unit is scheduled for installation in July 1965.

The Tracy plant will be tied to a 230/115-kv., 400,000-kva. terminal station which was completed at St. Césaire. A second terminal station with initial capacity of 100,000 kva. was constructed at l'Assomption and five distribution sub-stations were completed at various locations. Some 80 miles of 230-kv. transmission line was energized during the year as well as 350 miles of new distribution line. At the year's end, the Company was supplying electricity to 40,500 rural customers.

GATINEAU POWER COMPANY

During 1963, the Company rebuilt several lines, raising the

voltage from 36.4 kv. to 69 kv., and a new 69-kv. line was completed between Paquin and New Glasgow. Three sub-stations for use at 69 kv. and six distribution sub-stations were brought into service. At Gatineau, a new 30,000-kva., 115-kv. sub-station went into operation. The Company extended its rural distribution lines by some 140 miles and raised additional distribution lines to 14.4/25 kv. About 9,000 farm customers were receiving electric service at the end of 1963.

SOUTHERN CANADA POWER COMPANY

The Company completed installation of a new terminal sub-station, consisting of two 200,000-kva., 230/115-kv. transformers, at St. Césaire. In 1964, the Company expects to double the capacity of its 115/149.4-kv. sub-station near Granby by adding a 50,000-kva. transformer. A total of 13,825 farm customers were being supplied with electricity at the end of 1963.

QUÉBEC POWER COMPANY

During 1963, the Company extended a double circuit 66-kv. line by some 7 miles, and in 1964 proposes to erect another 4 miles of line with the same capacity.

LOWER ST. LAWRENCE POWER COMPANY

The Company commenced construction of a 32-mile section of 161-kv. transmission line. Capacity at the Company's Luceville sub-station was increased from 600 kva. to 2,000 kva. while the Cabano sub-station was raised from 2,000 kva. to 5,000 kva. At the end of August 1963, the Company was serving 7,691 customers.

NORTHERN QUÉBEC POWER COMPANY

During 1963, the Company reconstructed a 13-mile section of 110-kv. line from Provencher sub-station to the Ontario boundary and energized 7 miles of 12-kv. line to service mining areas in Dubuisson and Malartic Townships. The capacity of the Company's substation at Val d'Or was raised to 33,000 kva. by the transfer of a 3,000-kva. transformer from its Cadillac sub-station.

SAGUENAY ELECTRIC COMPANY

During 1963, the Company built a 5,000-kva. distribution sub-station at Port Alfred and another at Arvida. Some 15 miles of 27.6-kv. line was brought into service during the year while a total of 127 miles of sub-transmission line was purchased from the Saguenay Transmission Company.

L'OFFICE DE L'ÉLECTRIFICATION RURALE

The Bureau, an agency of the Québec government, constructed a 17-mile, 69-kv. transmission line between Gaspé and Rivière au Renard on the Gaspé Peninsula. A distribution sub-station was erected at Rivière au Renard for the "Coopérative d'Électricité de Gaspé Sud". In the Laurentians, a 10,000-kva. sub-station was completed at St. Donat for the "Coopérative d'Électricité de St. Donat".

COOPÉRATIVE D'ÉLECTRICITÉ DE BONAVENTURE

The Cooperative added 20 miles of 69-kv. line to its system between New Carlisle and Port Daniel. A 2,500-kva. sub-station was installed at New Carlisle while 15,000 kva. of capacity at that location was transferred to Port Daniel. The cooperative was serving approximately 7,000 rural customers in 1963.

ASBESTOS CORPORATION LIMITED

The Corporation has announced tentative plans to build a thermal-electric plant with associated sub-station and transmission facilities at Asbestos Hill in the Ungava region. As proposed, the plant would consist of six to eight diesel units with a total capacity of 10,000 kw. for initial service between 1966 and 1970. Power from the plant would be used to operate an asbestos mill and supply the requirements of a townsite with a population of about 1,000 people.

CITY OF MEGANTIC

In April 1962, the City's 4,500-hp. Gayhurst Hydro-Electric Station on the Chaudière River ceased operation when a diversion channel was cut to prevent the possible failure of the station's earth dam. In August 1963, a wooden dam at the outlet of Lake Megantic was washed out, affecting a second City plant. The dam served to store water in the lake in order to regulate the flow to the City's 4,800-hp. Chaudière plant.

THE CITY OF SHERBROOKE

During 1963, a 7,500-kva. sub-station and another of 3,750 kva., were placed in service and a 46-kv. transmission line, 3 miles long, was constructed in the east end of the City.

DEPARTMENT OF NATURAL RESOURCES - PROVINCE OF QUÉBEC

Throughout the year, the Water Resources Branch of the Québec Department of Natural Resources maintained the desired regulation of flow on the St. Maurice, Gatineau, Lièvre, North, St. Anne-de-Baupré, St. François, du Loup, and Mitis Rivers by the operation of a system of 29 storage dams and reservoirs.

New Brunswick

No new hydro or thermal-electric capacity was brought into operation during 1963 in the Province. Considerable progress was made, however, in the development of new plants, both hydro-electric and thermal-electric, and several proposals have been made which, if followed through, will ensure that large quantities of electric power will be available for use in New Brunswick. A rapid growth in power needs is foreseen through the establishment of four new industrial plants in the Province, one connected with mining, another with manufacturing and two others with pulp and paper production.

Work is scheduled for completion in 1964 on 60,500 kw. of thermal-electric equipment, while another 100,000 kw. of thermal-electric and 24,600 kw. of hydro-electric generating capacity are under construction for service in 1965 or 1966.

NEW BRUNSWICK ELECTRIC POWER COMMISSION

The Commission, while currently placing the major emphasis on thermal-electric development, has maintained its interest in the water resource possibilities in the Province.

In the thermal field, the 60,500 kw. scheduled for service in 1964 will be installed in Commission plants. This total consists of a 60,000-kw. unit to be installed at Grand Lake, more than doubling the existing 43,750 kw. now in service at that location, and a 500-kw. diesel unit to be added at Grand Manan, increasing that plant's capacity to 1,490 kw.

To offset rising power demand, construction of a 100,000-kw. thermal unit scheduled for operation by 1966, was begun. The new unit will be located at East Saint John as an extension to the existing 50,000-kw. Courtenay Bay plant.

In the water resource field, ice cover on the Saint John River during the winter of 1962-63 facilitated completion of a drilling programme at the proposed Mactaquac site, some 14 miles upstream from Fredericton. In its report for 1963, the Commission states that a plant at that site would be economically attractive, and adds that the development would consist of a rock-fill dam across the main river channel, with a plant generating capacity of about 500,000 kw. As envisaged, the development would require the formation of a headpond with an area of about 28 square miles, which it is anticipated would become a popular recreation area. In addition to investigations of the Mactaquac site, the Commission continued studies on overall development of the Saint John River.

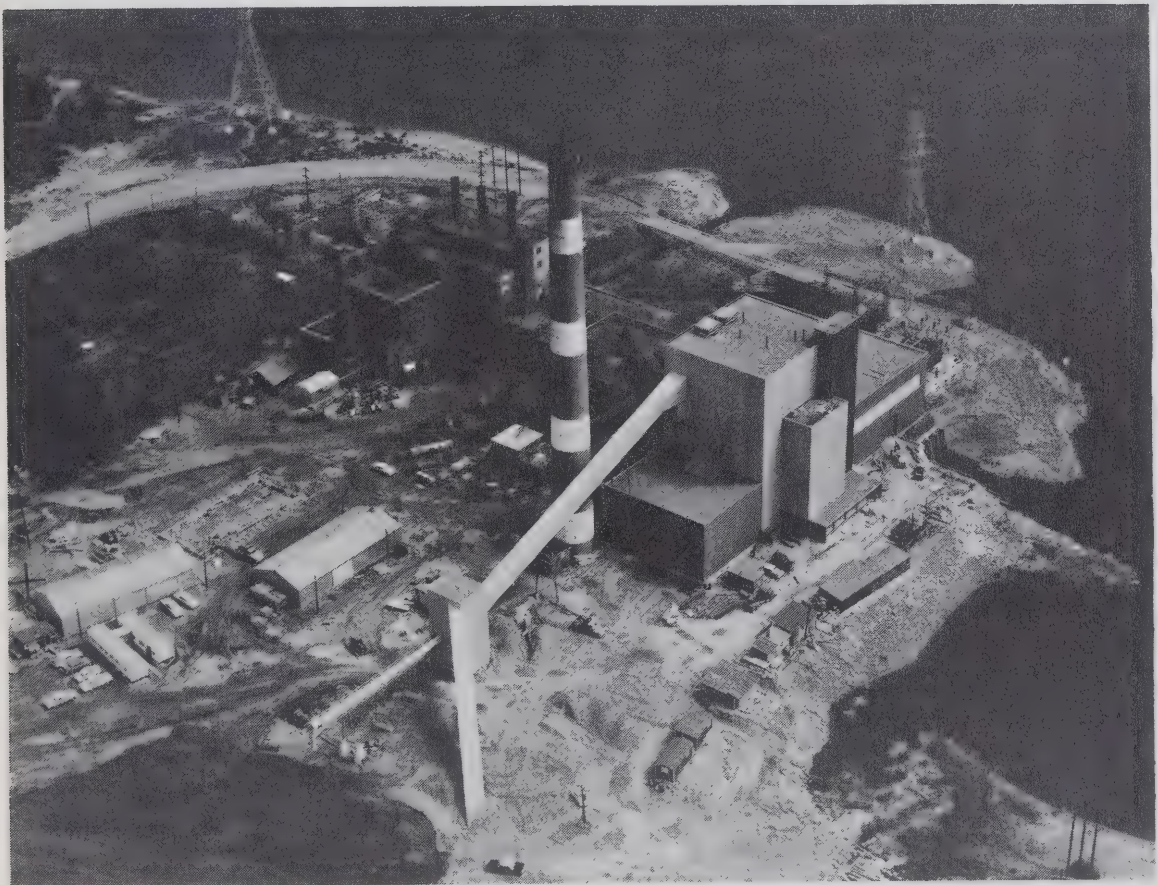
The Commission reports that a total of 60,000 kva. of new capacity was being installed at several sub-stations and a new 30/40/50-mva.

terminal station, the Eel River Terminal, near Dalhousie, also was under construction. Construction of about 50 miles of 69-kv. line was brought to completion in 1963 while 90 miles of 138-kv. line was under construction at the year end. The number of miles of distribution line maintained by the Commission rose above 8,300 in 1963 when some 73 miles of new line was completed and an additional 300 miles acquired with the purchase of the distribution systems of the Town of Sussex and the Maine and New Brunswick Electric Power Company Limited.

MAINE AND NEW BRUNSWICK ELECTRIC POWER COMPANY LIMITED

The Company began construction to extend its Aroostook River plant at Tinker Falls. When completed early in 1965, the generating capacity of the plant will have increased to 34,640 kw. from the present capacity of 10,040 kw.

As previously mentioned, the Company's distribution system was sold to the New Brunswick Electric Power Commission. This move was carried out to effect economies in operation, both utilities recognizing for some time that the acquisition would be necessary to avoid duplication of facilities.



Extension to Grand Lake Generating Station in New Brunswick.

Nova Scotia

In recent years, development of Nova Scotia's electric power generating facilities had been confined to strengthening the overall distribution pattern, and for the second consecutive year, no new electric generating capacity was scheduled for completion. A start was made, however, on the construction of a 100,000-kw. thermal plant and possibilities exist for a start at one or more water power sites within the next year or so.

NOVA SCOTIA LIGHT AND POWER COMPANY LIMITED

Site clearing was completed and construction of a single-unit, 100,000-kw. steam plant was begun at Tufts Cove, on the upper reaches of Halifax harbour. The unit, which is expected to be in service by 1965, is the first of a multi-unit complex which may eventually have a capacity exceeding 500,000 kw.

The Company is giving active consideration to the construction of hydro-electric developments on the Nictaux River at Alpena and on the Allain (Lequille) River at Lequille. The Nictaux development, with a single 5,000-kw. generator driven by a 6,500-hp. turbine, is not expected to be in service before 1968. The Allain River development, which will comprise a 7,500-hp. turbine connected to a 5,600-kw. generator, is not expected to be completed until at least 1970.

During 1963, the Company was constructing a total of 56,000 kva. of new sub-station capacity. Completions to transmission and distribution lines included 10 miles at 69 kv., 2 miles at 23 kv. and some 20 miles of distribution line, while another 20 miles of 69-kv. line remained under construction at year's end.

NOVA SCOTIA POWER COMMISSION

The Commission is considering the construction of two hydro-electric developments at Riverdale on the Sissiboo River and at Wreck Cove on Wreck Cove Brook. There is no indication as yet of when the construction of either development will commence. However, plans for the Riverdale development call for the installation of a single 8,000-hp. unit operating under a 90-foot head, while estimates for the Wreck Cove plant indicate a possible ultimate capacity of 90,000 hp.

During 1963, the Commission was constructing a total of 60,000 kva. of new sub-station capacity. A total of 22.2 miles of 23-kv. line and 12.4 miles of distribution line was energized during the year, while some 20 miles of 69-kv. line remained under construction.

EASTERN LIGHT AND POWER COMPANY LIMITED

During 1963, the Company completed construction of nearly 6 miles of 23-kv. transmission line and about 2.6 miles of distribution line.

SEABOARD POWER CORPORATION LIMITED

The Power Corporation was constructing a 5,000-kva. sub-station at Sydney and 3.5 miles of 22-kv. transmission line from Sydney to Sydney Mines.

Prince Edward Island

Recently, new frozen food plants and fish processing plants began operation in the island province, helping to raise the annual electric requirements by some 12 per cent. To meet this need, the Province, which depends almost exclusively on thermal-electric generation to satisfy its power needs, added new thermal capacity totalling 22,250 kw. in 1963.

MARITIME ELECTRIC COMPANY LIMITED

The Company reports that construction of a 20,000-kw. unit at the Charlottetown plant was completed during the year, raising the generating capacity of the plant to 52,500 kw.

Some 50 miles of line was added to the Company's distribution system during 1963.

TOWN OF SUMMERSIDE

The addition of a 2,250-kw. unit to the Summerside plant, previously reported for 1962, was not completed until May 1963. Total generating capacity of the plant was raised to 6,890 kw. when the new unit went on line.

Newfoundland

The Province of Newfoundland, which includes Labrador, was the only Atlantic Province to add hydro-electric capacity during 1963. During the year, almost 100,000 kw. of hydro-electric generating capacity was placed in operation, while a comparatively small net total of 2,140 kw. of thermal generating capacity also was brought into service.

Proposed harnessing of the Hamilton River in the immediate future promises to be a very significant factor in the field of power development in the Province. The bulk of the output, however, would have to be exported, as the Province alone would not be able to utilize this very large amount of additional power.

TWIN FALLS POWER CORPORATION LIMITED

The Corporation which was formed by Hamilton Falls Power Corporation Limited, Iron Ore Company of Canada and Wabush Iron Company Limited completed the second stage of development at its Twin Falls plant with the installation of a third and fourth unit. The development, located on the Unknown River in Labrador, now has four 60,000-hp. turbines driving four 46,800-kw. generators. Power from this project is supplied to mine centres at Labrador City and at the City of Wabush.

A second 110-mile transmission line, paralleling the existing 230-kv. line, is under construction for use in the spring of 1964. This second line will increase the reliability of the system as well as doubling the capacity to supply the growing needs of the Wabush area.

NEWFOUNDLAND LIGHT AND POWER COMPANY LIMITED

During 1962, the Company completed construction of a hydro-electric development on Sandy Brook, some eight miles west of the Town of Grand Falls on the island portion of the Province. The plant consists of a single 8,000-hp. turbine connected to a 5,950-kw. generator and augments the supply from the Company's 17,000-hp. Rattling Brook plant completed in 1958. The Company dismantled its 300-kv. diesel plant at Baie Verte during 1963.

In 1963, clearing of right-of-way was nearing completion for a 185-mile transmission line from St. John's to Gander. The line will not be completed until 1965, at which time it will be energized at 66 kv. Eventually, however, it is expected that the line will be converted to 138-kv. Elsewhere in its system, the Company was constructing 9 miles of 66-kv. line and another 11 miles at 25 kv.



Erection of penstocks 3 and 4 at Twin Falls on the Unknown River in Labrador.

HAMILTON FALLS POWER CORPORATION LIMITED

Development of the water resources of the Hamilton River in Labrador has been very much in the news in recent months. This has come about through discussions between the Premiers of Newfoundland and Québec and with representatives of the British Newfoundland Corporation Limited, the parent Company.

In a recent annual report, the Corporation stated:

"A recent change in national policy would envisage contracts on a long term basis for the export from Canada of large amounts of surplus power. The objective is to facilitate the development of Canadian power projects which may be too large initially to be supported by the present domestic market. We are exploring the possibility that any Hamilton power which is not needed in Canada may be exported to the United States."

Early reports by the Corporation suggested that the Grand Falls site on the the Hamilton River would be developed in stages of about 1 million horsepower each, up to approximately 4 million horsepower. Recently, however, unofficial reports have listed the proposed capacity of this development at as high as 6 million horsepower.

SOUTHERN NEWFOUNDLAND POWER AND DEVELOPMENT LIMITED

The Company is planning to construct a hydro-electric generating station on the Salmon River at Head Bay d'Espoir. It is expected that initial installation will consist of 77,000 hp. in two units, operating under a head of approximately 550 feet. No information has as yet been released, however, with respect to the schedule of construction of this development. Ultimate development of the site may reach 350,000 hp.

WABUSH MINES

The Company reports that two 1,000-kw. diesel units were added at its Wabush Lake Thermal Plant in 1963, bringing the total plant capacity to 4,000 kw. in four units. All four units are for use as standby equipment in the event of a failure in the transmission system from the Twin Falls development.

UNITED TOWNS ELECTRIC COMPANY LIMITED

During 1963, the Company was constructing a diesel plant to consist of three units of 500 kw. each, at Salt Pond, near Burin on Burin Peninsula. The units are expected to be in service early in 1964.

BOWATER POWER COMPANY LIMITED

In 1963, construction of a 79-mile, 115-kv. line from Howley to Baie Verte was completed.

NEWFOUNDLAND POWER COMMISSION

The Commission was established by the provincial government in 1958 to extend service into rural areas which cannot be served economically by the Province's power companies. However, these companies assist the Commission in regard to the cost of this service.

During 1963, the Commission placed in service three new diesel plants with capacities totalling 440 kw. and continued with the installation of units totalling 1,140 kw. at five other plants. Some 14.7 miles of transmission line varying from 7.2 to 14.4 kv. was completed during the year and another 148 miles of line varying from 7.2 to 25 kv. was under construction at year's end.

Yukon and Northwest Territories

During 1963, the total generating capacity of the Territories was increased by 4,385 kw. of thermal-electric capacity. Although construction will be started on an 18,000-kw. hydro-electric station in 1964, no new thermal or hydro-electric capacity is proposed for service during the coming year.

NORTHERN CANADA POWER COMMISSION

The agency now known as the Northern Canada Power Commission was established in 1948 by the Government of Canada to encourage the development of the resources of Northern Canada. The Commission is empowered to construct and operate public utility generating stations in the Yukon and Northwest Territories and, subject to approval of the Governor General-in-Council, in any other part of Canada.

In 1963, the Commission installed a 1,000-kw. diesel unit at its Inuvik thermal-electric plant to meet the increasing needs of that community. The total generating capacity of the Inuvik plant is now 3,460 kw.

At Frobisher Bay, a new thermal plant was brought into service in 1963 to serve the general Frobisher Bay area. The new plant contains two new units, a 1,000-kw. diesel and a 1,500-kw. gas turbine, and two 1,000-kw. diesels that were transferred from the old plant. Operation of the old plant, now consisting of four 250-kw. units, has reverted to the Department of Transport.

Investigations are complete and construction of an 18,000-kw. hydro-electric plant is scheduled to begin early in 1964 at Twin Gorges on the Taltson River, some 35 miles northeast of Fort Smith. The new plant will make possible the extension of mining activities in the Pine Point area, and will serve the further needs of Fort Smith. Power from the new plant is expected to be available by December 1965.

YUKON ELECTRICAL COMPANY LIMITED

During 1963, the Company increased the capacity of two of its thermal plants and placed in service two other thermal plants in the Yukon Territory. To the Company's Watson Lake plant was added a 150-kw. unit and to its Carmack plant a 75-kw. unit, raising the installed capacities of these plants to 1,300 kw. and 145 kw. respectively. In a new plant at Beaver Creek, three diesel-electric generators with a total capacity of 310 kw. were installed. The other new plant, at Destruction Bay, has an installed capacity of 350 kw. in two units.

Development of Electric Power Generating Facilities

Summary for 1963

Part I - Hydro

DEVELOPMENT	RIVER	HYDRO - ELECTRIC CAPACITY										REMARKS
		INSTALLED DURING 1963			TOTAL STATION CAPACITY AT END 1963			PROPOSED FOR INSTALLATION				
								IN 1964		AFTER 1964		
								No. of Units	Total Turbine Generator Capacity hp.	Total Generator Capacity kw.	No. of Units	

British Columbia

CONSOLIDATED MINING AND SMELTING COMPANY LIMITED		1	130,000	72,000	370,000	216,000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
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Alberta

CALGARY POWER LTD.													
Big Bend	Brazeau												
	Pumping-Generating												
TOTAL								210,000	150,000				
								11,000	9,720				
								221,000	159,720				

This site is associated with the Big Bend development.

Saskatchewan

SASKATCHEWAN POWER CORPORATION		4	184,000	134,000	184,000	134,000	2	92,000	67,000		252,000	186,600	Provision for a seventh and eighth unit.
Squaw Rapids	Saskatchewan												
	South Saskatchewan												
TOTAL			184,000	134,000				92,000	67,000		252,000	186,600	

Manitoba

MANITOBA HYDRO							2	300,000	220,000	1	150,000	110,000	Provision for a fourth unit.
Grand Rapids	Saskatchewan												
TOTAL								300,000	220,000		150,000	110,000	

Ontario

THE HYDRO-ELECTRIC POWER COMMISSION OF ONTARIO		2	120,000	87,400	240,000	174,800				4	240,000	174,800	
Otter Rapids	Abitibi												
	Mattagami												
Little Long		2	168,000	121,600	168,000	121,600				2	168,000	121,600	
Harmon										4	376,000	258,400	
Kipling										4	376,000	258,400	
GREAT LAKES POWER CORPORATION LIMITED													
Hogg	Montreal							21,750	15,000				
TOTAL			288,000	209,000				21,750	15,000		1,160,000	813,200	

DEVELOPMENT	RIVER	H Y D R O - E L E C T R I C C A P A C I T Y											R E M A R K S		
		INSTALLED DURING 1963			TOTAL STATION CAPACITY AT END 1963			P R O P O S E D F O R I N S T A L L A T I O N							
								IN 1964		AFTER 1964					
		No. of Units	Total Turbine Generator Capacity	hp.	kw.	Turbine hp.	Generator kw.	No. of Units	Total Turbine Generator Capacity	hp.	kw.	Total Turbine Generator Capacity		hp.	kw.

Québec

QUÉBEC HYDRO-ELECTRIC COMMISSION													
Carillon	Ottawa	6	360,000	270,000	600,000	450,000	4	240,000	180,000	8	1,800,000	1,344,000	
Manic 5	Manicouagan												
Manic 2	Manicouagan									8	1,360,000	1,120,000	
Manic 3	Manicouagan									7	1,470,000	1,120,000	
Manic 1	Manicouagan									4	300,000	208,000	
Outardes 58	Outardes									4	800,000	600,000	
Outardes 45	Outardes									4	1,040,000	880,000	
Rapid II	Ottawa						1	16,000	12,000				
MANICOUAGAN POWER COMPANY													
McCormick	Manicouagan				292,400	191,250					150,000	104,000	
QUÉBEC NORTH SHORE PAPER COMPANY													
Outardes Falls	Outardes				70,600	50,000				3	405,000	312,000	
TOTAL			360,000	270,000				256,000	192,000		7,325,000	5,688,000	

New Brunswick

[illegible]

Nova Scotia

[illegible]

H Y D R O - E L E C T R I C C A P A C I T Y												
DEVELOPMENT	RIVER	INSTALLED DURING 1963			TOTAL STATION CAPACITY AT END 1963			PROPOSED FOR INSTALLATION				
		No. of Units	Total Turbine Capacity hp.	Total Generator Capacity kw.	Turbine hp.	Generator kw.	IN 1964			AFTER 1964		
							No. of Units	Total Turbine Capacity hp.	Total Generator Capacity kw.			
											No. of Units	Total Turbine Capacity hp.
R E M A R K S												

Newfoundland

NEWFOUNDLAND LIGHT AND POWER COMPANY LIMITED		1	8,000	5,950	8,000	5,950																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
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Part II - Thermal

DEVELOPMENT	Type	THERMAL - ELECTRIC CAPACITY								REMARKS
		INSTALLED DURING 1963		TOTAL STATION CAPACITY AT END 1963 kw.	PROPOSED FOR INSTALLATION					
		No. of Units	Total Capacity kw.		IN 1964		AFTER 1964			
					No. of Units	Total Capacity kw.	No. of Units	Total Capacity kw.		
British Columbia										
BRITISH COLUMBIA HYDRO AND POWER AUTHORITY										
Burrard	S	1	150,000	300,000	1	150,000	3	450,000		
Prince George	IC	1	6,000	29,000						
MACMILLAN, BLOEDEL AND POWELL RIVER LIMITED										
Harmac	S	1	31,680	36,930						
TOTAL			187,680			150,000		450,000		
Alberta										
CITY OF EDMONTON										
Edmonton	S		75,000	330,000				75,000		
CANADIAN UTILITIES LIMITED										
Battle River	S			32,000		32,000				
NORTHLAND UTILITIES										
Lac La Biche	IC			0					1,250-kw. plant removed from service.	
CALGARY POWER LTD.										
Wabamun	S							225,000		
TOTAL			75,000 1,250 73,750	(new capacity) (removed from service) (net increase)		32,000		300,000		

Saskatchewan

[illegible]

Manitoba

[illegible]

Ontario

THE HYDRO-ELECTRIC POWER COMMISSION OF ONTARIO		S	1	100,000	100,000	1	300,000	5	1,500,000	Plant scheduled for completion late in 1968 with a total of 8 units.
Thunder Bay Lakeview		S			600,000				200,000	
Douglas Point		N								
DOW CHEMICAL OF CANADA LIMITED										
Sarnia		S	2	61,000	61,000					
INTERNATIONAL NICKEL COMPANY OF CANADA LIMITED										
Copper Cliff		S	2	17,800	17,800					
ALGOMA STEEL CORPORATION LIMITED										
Sault Ste. Marie		S	2	25,000	29,500					
TOTAL				203,800			300,000		1,700,000	

IC - Internal Combustion, S - Steam, N - Nuclear

DEVELOPMENT	Type	THERMAL - ELECTRIC CAPACITY								REMARKS
		INSTALLED DURING 1963		TOTAL STATION CAPACITY AT END 1963 kw.	PROPOSED FOR INSTALLATION					
		No. of Units	Total Capacity kw.		IN 1964		AFTER 1964			
					No. of Units	Total Capacity kw.	No. of Units	Total Capacity kw.		
Québec										
THE SHAWINIGAN WATER AND POWER COMPANY										
Tracy	S				1	150,000	1	150,000	Proposals for other units when required.	
Asbestos Hill	IC						6-8	10,000	Tentative plans for 6-8 units to come into service between 1966 and 1970.	
TOTAL						150,000		160,000		

New Brunswick

NEW BRUNSWICK ELECTRIC POWER COMMISSION								
Grand Manan	IC			990	1	500		
Grand Lake No. 3	S				1	60,000		
Courtenay Bay	S			47,500				100,000
TOTAL						60,500		100,000

Prince Edward Island

MARITIME ELECTRIC COMPANY LIMITED								
Charlottetown	S	1	20,000	52,500				
TOWN OF SUMMERSIDE								
Summerside	IC	1	2,250	6,890				
TOTAL			22,250					
Previously reported as in service in 1962. Now reported as installed in May 1963.								

Nova Scotia

NOVA SCOTIA LIGHT AND POWER COMPANY LIMITED		S									100,000	
Tufts Cove												
TOTAL											100,000	

Newfoundland

UNITED TOWNS ELECTRIC COMPANY LIMITED		IC						3		1,500		
Salt Pond												
WABUSH MINES												
Wabush Lake		IC	2	2,000	4,000							
NEWFOUNDLAND POWER COMMISSION												
Musgrave Harbour		IC		230	230							
La Scie		IC		130	130							
Triton		IC		80	80							
Happy Valley		IC		400	400				500			
Harbour Breton		IC							200			
Woody Point - Bonne Bay		IC							200			
Ramea		IC							120			
Roddickton		IC							120			
NEWFOUNDLAND LIGHT AND POWER COMPANY												
Baie Verte		IC										300-kw. plant removed from service.
TOTAL				2,440	(new capacity)				2,640			
				300	(removed from service)							
				2,140	(net increase)							

IC - Internal Combustion, S - Steam

DEVELOPMENT	Type	THERMAL - ELECTRIC CAPACITY								REMARKS
		INSTALLED DURING 1963		TOTAL STATION CAPACITY AT END 1963 kw.	PROPOSED FOR INSTALLATION					
					IN 1964		AFTER 1964			
No. of Units	Total Capacity kw.	No. of Units	Total Capacity kw.	No. of Units	Total Capacity kw.	No. of Units	Total Capacity kw.			
Yukon Territory										
YUKON ELECTRICAL COMPANY LIMITED										
Carmacks	IC	1	75	145						
Watson Lake	IC	1	150	1,300						
Beaver Creek	IC	3	310	310						
Destruction Bay	IC	3	350	350						
TOTAL										885

Northwest Territories

NORTHERN CANADA POWER COMMISSION									
Frobisher Bay	IC & GT	2	2,500	4,500					New plant placed in service. The plant consists of two new units, a 1,000-kw. diesel and a 1,500-kw. gas turbine, and two other 1,000-kw. diesel units transferred from old plant.
Inuvik	IC	1	1,000	3,460					
TOTAL			3,500						
NET TOTAL FOR CANADA									
			434,455		695,140		2,810,000		

IC - Internal Combustion, GT - Gas Turbine

